



**Unidentified retracted articles in publisher's websites,
bibliographic databases, social academic networks, and Sci-
Hub black open access website: a problem that should no
longer be ignored**

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4 1 **Unidentified retracted articles in publisher's websites, bibliographic**
5 2 **databases, social academic networks, and Sci-Hub black open**
6 3 **access website: a problem that should no longer be ignored**
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35 **KEY MESSAGES**

- 36 • **Publishers' websites and sites hosting references and/or full-text academic**
- 37 **articles insufficiently identify retracted articles**
- 38 • **Retracted articles that are not identified as such may continue to be cited,**
- 39 **propagating scientific error**
- 40 • **Solutions such as maintain up to date databases for sites hosting articles or**
- 41 **better adhesion to COPE retraction guidelines exist, but these solutions have**
- 42 **been unevenly applied to highlight when an article has been retracted**
- 43 • **All stakeholders must be aware of the importance of dealing appropriately**
- 44 **with retracted articles and must urgently act in this direction**
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24 **Contributors and sources**

25 CB and FM have published articles related to bibliometrics in the past several years,
26 especially in ophthalmology. They have also studied the difficulty involved in accessing
27 scientific literature around the world with KH, a specialist in information science. The idea for
28 this article came from FM who had used a retracted article in his bibliography. Short
29 interviews with colleagues showed that this topic was relatively unknown.

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3 30 CB and FM drafted the manuscript; CB and FM extracted data. CB analyzed data; and CB,
4 31 KH and FM revised the manuscript critically for important intellectual content. All authors
5 32 approved the final version of the manuscript. CB is the guarantor of the article.
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8 33

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11 37 discussions related to this article.
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16 39 **Patient involvement**

17 40 No patients were involved in this work.
18 41

19 42 **Conflicts of Interest**

20 43 We have read and understood [BMJ policy on declaration of interests](#) and we have no
21 44 conflicts of interest to declare.
22 45

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32 55 *Christophe Boudry and colleagues call for better identification of retracted articles on*
33 56 *publishers' websites and sites hosting references and/or full-text articles, to stop retracted*
34 57 *articles being cited without reference to the retraction and thus avoiding scientific error*
35 58 *propagation.*
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3 59 Again, in December 2022, a high profile paper was retracted [1]. Article retraction is defined
4 60 as the withdrawal of a previously published article in an academic journal [2], and is
5 61 understood to be “a mechanism for correcting the literature and alerting readers to articles
6 62 that contain such seriously flawed or erroneous content or data that their findings and
7 63 conclusions cannot be relied upon” [3]. Although retractions are still rare, with around 0.5
8 64 retractions per 100,000 articles published [4–6], numerous papers have highlighted an
9 65 increasing rate of retractions over time – in fact, it has doubled in the last ten years [4,5,7–9]
10 66 (see Box 1). The COVID-19 crisis has been the source of a significant number of article
11 67 retractions [10–12], with high retraction rates compared to some related research fields for
12 68 example up to four times higher compared to other infectious diseases such as HIV, H1N1
13 69 or Ebola. Academic article retraction mainly results from inadvertent errors or mistakes, non-
14 70 replicable findings, research misconduct, and redundant or duplicate publication [13]. In
15 71 2020, the most common reason for retraction of biological and medical research articles was
16 72 scientific misconduct (62.3%), followed by error(s) in the manuscript (37.4%) and issues with
17 73 the journal or publisher (19.4%) [6]. Nearly 70% of retracted articles had more than 1 reason
18 74 for retraction [6]. Retractions “represent wasted resources incurring significant financial
19 75 costs” [14]: in a research article, Stern et al. found that retracted articles due to research
20 76 misconduct accounted for approximately \$58 million in direct funding from the NIH between
21 77 1992 and 2012 [14]. Moreover, article retractions participate in scientific error propagation
22 78 and may put patients at risk, especially when clinical papers are based on findings from
23 79 retracted papers [4,10,15], or when retracted articles continue to be cited without reference
24 80 to the retraction [16–21], also in clinical trials reports [22] and meta analyses [23].
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40 82 Theoretically, citations should stop as soon as articles are retracted. In fact, retractions have
41 83 little or no impact on the total number of citations, showing that researchers continue to cite
42 84 retracted articles without reference to the retraction [16–22]. For example, a research article
43 85 paper published in Plos One analysed 54 retracted papers related to reporting a radiology-
44 86 imaging diagnostic method: for 30 of 54 articles (55.6%), the number of post-retraction
45 87 citations was higher than the number of citations before retraction [13]. Moreover, of 559
46 88 total post retraction citations of these 54 articles, 546 (97.7%) did not reference the
47 89 retraction, suggesting that the majority of citing articles were either not aware of the
48 90 retraction, or they were aware of the retraction and cited it anyway. This problem extends to
49 91 high-profile journals: a paper published in Cell in 2010 [24] was retracted in 2014 but
50 92 continued to be widely cited by 2016 without mentioning the retraction in 94% of post-
51 93 retraction citations [21].
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3 95 While the Committee on Publication Ethics (COPE) [3] has published specific
4 96 recommendations to help publishers facilitate and standardize their management of the
5 97 retraction process, publishers may not correctly identify retracted articles as such on their
6 98 website [18,25–27]. Furthermore, copies of retracted articles can be hosted on a range of
7 99 different websites (preprint servers, bibliographic databases, academic social networks or
8 100 illegal black open access websites and may not be identified as retractions [16,17,22,28,29].
9 101 These unidentified retracted articles continue to be cited by authors without reference to the
10 102 retraction and then may survive online [16–22]. We argue that a multi-pronged approach
11 103 including actions by sites hosting articles, journals and authors is needed to solve this
12 104 worrying problem. We also support that the persistence of this problem is as much
13 105 incomprehensible that some simple-to-implement solutions exist to overcome it.
14 106

107 **Box 1: Retractions of biological and medical science research articles**

108 The retraction rate per 10,000 publications was 0.38 in 1985, 2.03 in 2000 and rose to 5.95
109 in 2014. The majority of retractions occurred within 1 year of publication, with lower
110 retraction rates over time since publication. On average, articles are retracted 3.8 years after
111 their publication [5].

112 It is difficult to know if the increase in article retractions results from a rise in fraud and error
113 [30], or if the scientific community is improving its ability to detect and report them, reflecting
114 a more self-monitoring community [4,7,8,10,31]. Pressure to ‘publish or perish’, and the
115 ensuing increased competition to publish and find funding may contribute to an atmosphere
116 in which some individuals could be tempted to selectively report results, or worse, commit
117 outright fraud, both of which may lead to article retraction [32]. For journals’ part, accelerated
118 publication of research, as it was the case during the COVID-19 crisis [12,33,34] may be
119 associated with less rigorous peer-review, [35] further increasing the risk of retraction.

120 **Online survival of unidentified retracted articles**

121 Since the late 1990s, there has been a large proliferation of article servers that have grown
122 around publishers’ websites. The number of different places where an article citation or full-
123 text could be accessed online is approximately 200, [36], including preprint servers,
124 bibliographic databases (e.g. Scopus, Wos, Google Scholar), academic social networks (e.g.
125 ResearchGate or Academia.edu), or illegal black open access websites (e.g. Sci-Hub).
126 Information on the retraction of articles should in principle appear first on the publishers’
127 websites and flow to other research websites and servers. Nevertheless, some publishers
128 are still not identifying retractions correctly on their websites [18,25–27]. In a research article
129 from 2013, of 233 retracted articles studied, 52 (22.3%) were not flagged as being retracted
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3 131 [25]. If articles are not corrected on publishers' websites, other sites hosting references
4 132 and/or full-text articles online may fail to identify them as retracted. For example, a
5 133 research article from May 2022 has shown that among the 30 preprints linked to retracted
6 134 journal publications present on Research Square, bioRxiv, and medRxiv, only 16 (53.3%)
7 135 included an indication of the retraction on the preprint [29]. Multidisciplinary databases such
8 136 as Scopus and the WoS do not always clearly and consistently display retractions [26], and
9 137 while Google Scholar is widely considered to be the most comprehensive source of scientific
10 138 information [37], it is well known to lack quality control and clear indexing guidelines [38]. For
11 139 example, two high-profile articles related to COVID-19 published in *NEJM* [39] and in *The*
12 140 *Lancet* [40], survived as non-retracted articles in Google Scholar five months after their
13 141 retraction [35]: 19 versions for the NEJM article, and 59 versions for The Lancet article.
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15 143 PubMed best adheres to procedures for documenting and updating retracted publications
16 144 and is considered the authoritative source for information about retractions [41]. In contrast,
17 145 there is currently no data available on the extent to which sites like Google Scholar,
18 146 ResearchGate and Sci-Hub mark retracted articles as retracted on their websites. We
19 147 checked 500 randomly selected retracted articles (from a total of 8559 retracted articles
20 148 listed in PubMed in April 2021) for the presence of any information allowing identification of
21 149 retraction in references and full-text articles [18,26,42]. Roughly 66.3% of references hosted
22 150 by Google Scholar were not identified as retracted, and 22.9% of references and 81.8% of
23 151 the full texts of retracted articles hosted by ResearchGate made no mention of retraction. In
24 152 Scopus and the WoS, 54.6% and 41.9% of references were not identified as retracted,
25 153 respectively. A 2021 research letter study corroborates our results with the poor identification
26 154 of retracted articles we observed in Scopus (50%) and the WoS (40.6%) [42]. Sci-Hub is
27 155 widely used by researchers and allows clinicians, especially in low income countries, to
28 156 obtain essential information and respond appropriately to patient care needs [43,44]. In our
29 157 sample, more than 71% of full texts downloadable on Sci-Hub were not marked as retracted.
30 158 Researchers using Sci-Hub thus have the double burden of not having good access to full
31 159 text articles, and also using a potentially biased subset of articles that does not account for
32 160 retractions. For comparison, publishers did a somewhat better job of identifying when an
33 161 article was retracted, but still did not flag 20.8% of references and 18.1% of full texts of
34 162 retracted articles as retracted (Table 1).
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36 164 **Table 1: Publishers' websites and sites hosting references and/or full-text articles**
37 165 **insufficiently identify retracted articles**

| | | Number of references available (%) | Number of references unidentified as retracted (%) | Of referenced articles, number of full text articles available (%) | Number of full text articles unidentified as retracted (%) |
|---|-----------------------------|------------------------------------|--|--|--|
| Publisher | Publishers' websites | 476 (95.2) | 99 (20.8) | 403 (84.7) | 73 (18.1) |
| Subscription-based bibliographic databases | Scopus | 403 (80.6) | 220 (54.6) | N/A | N/A |
| | WoS | 420 (84) | 176 (41.9) | N/A | N/A |
| Free bibliographic database | Google Scholar | 499 (99.8) | 331 (66.3) | N/A | N/A |
| Academic social network | ResearchGate | 497 (99.4) | 114 (22.9) | 176 (35.4) | 144 (81.8) |
| Black open access (illegal) | Sci-Hub | 437 (87.4) | 330 (75.5) | 435 (99.5) | 310 (71.3) |

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N/A means that the number and percentage of full texts articles unidentified as retracted could not be assessed because full texts were not hosted directly on the website. Full-text paywalled articles on publishers' websites were searched using institutional access through our universities. Searches using Sci-Hub were performed using non-university internet access. No university or institution affiliated with the authors of this article were therefore involved in downloading articles via Sci-Hub.

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3 171 **Reducing citations of retracted articles needs action by publishers, sites**
4 **hosting references and/or full-text articles, and authors**
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8 174 A number of solutions have been proposed to better recognize when articles have been
9 175 retracted online and to decrease their being cited. Most obviously, retracted articles should
10 176 be unmistakably identified as such by publishers: Suelzer et al. and Frampton et al., have
11 177 suggested that these ones should systematically add the prefix of 'retracted' to the title of
12 178 retracted articles [42] and diagonally watermark each page of the full text article stating
13 179 "retracted" or "withdrawn" [10]. Reasons why some publishers do not this systematically and
14 180 thus fail to alert readers to retractions remain unexplained: is it fear for their reputation or
15 181 ignorance of the seriousness of the problem of retractions? Improvement in adherence to
16 182 COPE guidelines could improve this situation [3,25], but this step alone would of course not
17 183 solve the problem. Databases and sites hosting references and/or full-text articles do not
18 184 identify retracted articles as retracted because they either never (e.g. Google Scholar or Sci-
19 185 Hub) or imperfectly (e.g. Scopus or the WoS) update their databases by themselves. The
20 186 fact that PubMed can and does update its references to reflect article retractions suggests
21 187 that this problem has not been recognized or considered a priority by these other sites.
22 188 Retraction Watch DataBase (RWDB) has been specifically developed to report retracted
23 189 articles [45]. It has identified more than 30000 retracted articles in all disciplines. It is the
24 190 most comprehensive and largest database of retracted articles, and its content is regularly
25 191 updated [4]. Considering partnership with the RWDB and/or referring to PubMed to identify
26 192 retracted articles could be a solution for these sites.
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40 194 For their part, authors can identify retracted articles by searching PubMed for "Retracted
41 195 publication [pt]", where the term "pt" in square brackets stands for publication type, or by
42 196 going directly to the PubMed list of retracted publications
43 197 (<https://pubmed.ncbi.nlm.nih.gov/?term=retracted+publication+%5Bpt%5D>) [41]. As a result
44 198 of partnering with the RWDB, reference management software such as Zotero and EndNote
45 199 are another efficient way to avoid citing retracted articles [17]. Unlike other reference
46 200 management software services (e.g., Mendeley), Zotero and EndNote have built-in
47 201 capabilities for monitoring retractions by checking the RWDB for retracted documents. This
48 202 feature was developed in partnership with the RWDB in 2019 for Zotero and in 2021 for
49 203 EndNote. As an example, retracted publications stored in Zotero and also present in the
50 204 RWDB are flagged in the Zotero article list, warning users that the stored article is retracted
51 205 (Figure 1). In addition, each time the software is run, all articles are checked for retractions in
52 206 the RWDB, allowing automatic updates over time. In our sample, Zotero or EndNote (and
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3 207 therefore the RWDB), would have identified 477 of the 500 retracted articles as being
4 208 retracted (95.4%). Nowadays "inappropriate citations of retracted articles are difficult to
5 209 excuse" [46] according the partnership of Zotero and EndNote with RWDB, and the absence
6 210 of drawbacks to use these tools (except for EndNote which is a commercial software).
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11 212 Publishers can also do more to avoid publishing articles citing retracted articles without
12 213 reference to the retraction. In 2006 the members of the International Committee of Medical
13 214 Journal Editors (ICMJE) changed the Uniform Requirements for Manuscripts to specify that it
14 215 is the author's responsibility to check their manuscripts for and remove references to
15 216 retracted articles [41]. To this end, publishers could require authors to attest that they have
16 217 checked their submitted manuscripts' references and that no retracted articles are included
17 218 unwittingly [42]. Unfortunately, few publishers have included such statements in their
18 219 submission guidelines (for example Plos One or Visualized Cancer Medicine), and these
19 220 recommendations do not address the issue (for authors and peer reviewers who depend on
20 221 the same information sources [17]) because retracted articles are not systematically
21 222 identified as retracted across online databases. Manuscript submission platforms could also
22 223 help authors identify retracted articles in their reference list. Some platforms, such as
23 224 Editorial Manager, in partnership with scite_ [47], have developed reference check tools to
24 225 track retracted article during manuscript submissions. Needless to say, not all journals (and
25 226 not even all journals hosted by Editorial Manager) use this tool.
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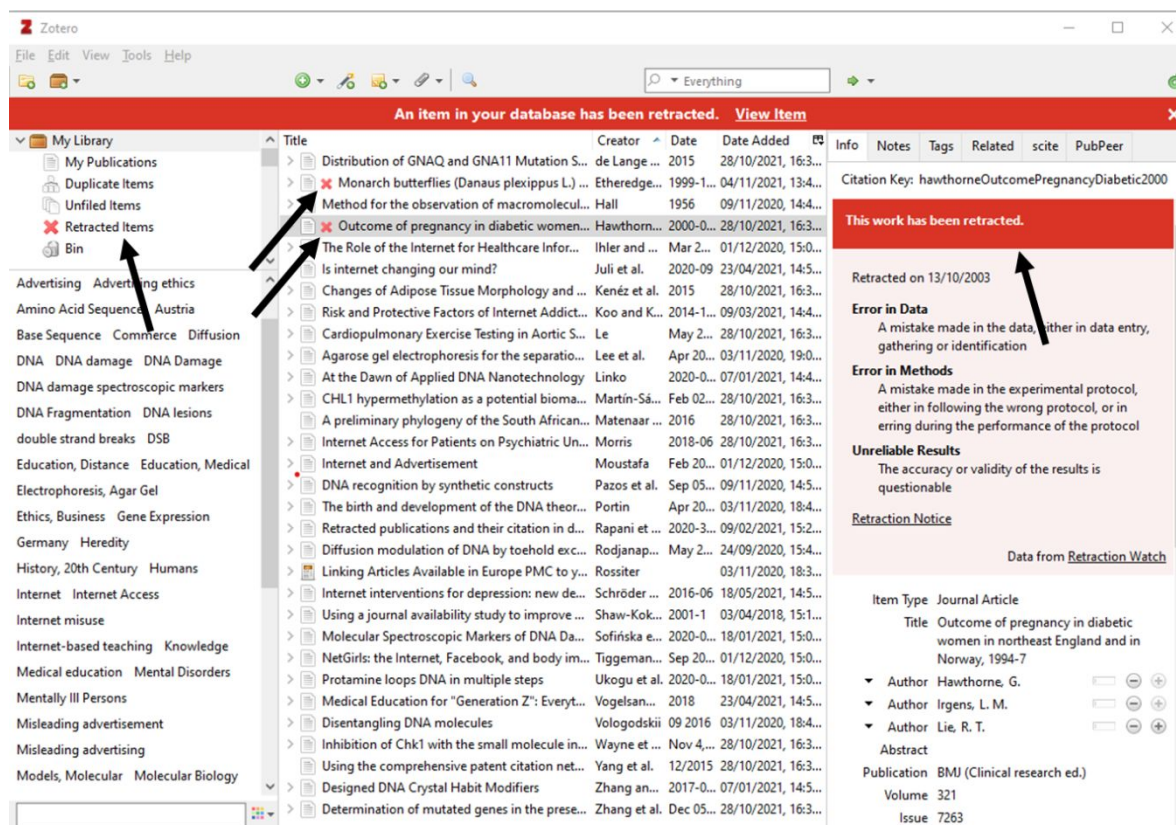


Fig 1 | Display of a retracted article in Zotero

In conclusion, despite COPE and ICMJE guidelines and the existence of reference management software services such as Zotero or EndNote, amidst a growing number of journals and a rising rate of retracted articles in the past two decades, retracted articles are not universally marked as retracted across multiple websites hosting references and/or full-text articles. Retracted articles continue to be cited long after their retraction, propagating errors and possibly affecting the accuracy of subsequent analyses [16–22] and, may have potential consequences in medicine for patient health [4,10,15]. Guidelines regarding retracted articles have existed for almost 25 years but have failed to improve the situation. This may be, in part, because the COPE guidelines do not provide any specific recommendations for tracking and deleting unlabelled retracted articles present on a multiplicity of websites and sites hosting references and/or full-text articles once a decision has been made to retract an article. It is also possible that the resolution of this problem, being dependent on multiple actors, has experienced an effect of dilution of their individual responsibility. We also assume that given that retractions are relatively uncommon, most researchers do not feel concerned by this problem. Nevertheless, the scientific community is increasingly aware of scientific integrity issues over time due to the rising of open science practices [48]. In the long run, this could put pressure on the journals or sites hosting articles to improve their practice regarding article retractions, which could indeed see in it an

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3 249 opportunity to stand out from the other actors in an increasingly competitive field. In any
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5 250 case, solving the worrying problem of the citation of retracted articles is a collective
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7 251 responsibility that requires a real commitment on the part of all actors involved in scientific
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